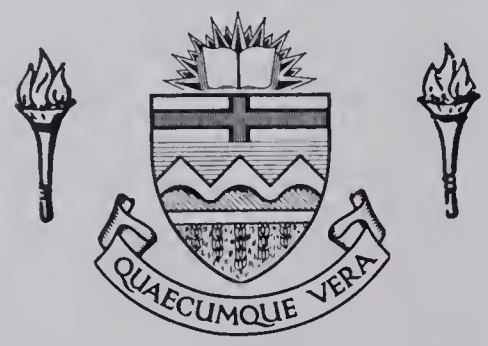

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GROUP COMPOSITION EFFECTS ON RISK TAKING

by

HUGH JOHN HALEY

A THESIS

SUBMITTED TO THE FACULTY OF GRADUATE STUDIES

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The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies for acceptance, a thesis entitled "Group Composition Effects on Risk Taking" submitted by Hugh John Haley in partial fulfilment of the requirements for the degree of Master of Arts.

ABSTRACT

Research in the area of group decision making under risk conditions has indicated that individuals tend to become more risky following discussion. The major problem confronting the area is to find an adequate explanation of why this risky shift occurs. Many possible explanations have been proposed, but, although few have been disproved, none have received adequate support.

This investigation attempted to examine evidence for one of the more popular explanations: that the group is more strongly influenced by the riskier individuals. This was done by selecting subjects on the basis of individual positions on the Choice Dilemmas Questionnaire. Subjects with different positions discussed the various items of the questionnaire in groups of four. Analysis consisted of comparisons between pre- and post-discussion scores.

Support for the explanation that risky individuals exert more influence was not found. It was demonstrated, however, that the individual's final decisions are influenced by the unanimity among the other members of the group. It was also demonstrated that the riskier individuals were less influenced by the group, even though this did not allow them to exert more influence. The results suggest that another explanation is needed to explain the risky shift phenomena.

Evidence was reported suggesting that social facilitation plays a role in the risky shift phenomena. The investigator also suggests that more adequate measurement techniques might be developed. These techniques might incorporate concepts developed in the area of mathematical model building.

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INTRODUCTION

Both economists and psychologists are interested in how people make a choice among various alternatives. Research in the area of decision making is often concerned with decisions made under risk conditions. Social psychologists have studied changes in preference for risk due to group influences. They have generally found that members of a group make riskier decisions than they had formerly made as individuals. One of the major problems now is to explain what mechanisms cause this risky shift.

The purpose of this thesis was to examine the effects of several group parameters on risk taking. Before presenting the study, the introduction will review various explanations that have been advanced for risk taking. Definitions of risk taking will be reported in the section on decision making models, followed by discussion of relevant research.

DECISION MAKING MODELS

Probability and Utility

On the basis of a review of economics and psychology, Edwards (1955) has listed four models which have been proposed for static decision making. Two concepts, the probability of obtaining a particular thing and the value of that thing, were used as a basis for these four models.

The first model was based on the assumption of traditional theory that gamblers choose the bet with the highest expected value. Expected value is defined as the amount of any valued commodity which a gambler receives, on the average, as a result of making a series of bets. This quantity is expressed in the equation: $EV = \sum_i p_i \$_i$, where p_i is the probability of the i^{th} outcome of the bet; $\$_i$ is the value of the i^{th} outcome of the bet in dollars; $\sum_i p_i = 1$; and all i are mutually exclusive.

The expected value model was a poor predictor of decision making where EV differences were small, although it improved somewhat as EV differences increased. Also bets whose composition are less complex were more accurately predicted by the EV Model. The predictability decreased as the complexity of the bets increased (Pruitt, 1962).

Bernoulli (1954) suggested that gamblers should choose the bet with the highest expected utility (EU). This quantity was expressed by the equation: $EU = \sum_i p_i u_i$, where u_i is the subjective value of the i^{th} outcome of the bet. The EU Model was better than the EV when EU differences between bets were small and increased in predictability as EU differences increased (Pruitt, 1962).

In opposition to the EU Model, Preston and Baratta (1948) suggested people choose among bets to maximize subjectively expected money value (SEM). This was expressed by the equation: $SEM = \sum_i p_i^* \$_i$, where p_i^* is the subjective probability corresponding to the objective probability of the i^{th} alternative. This model was fairly accurate in predicting choices between bets that differed in production of win or loss but whose outcomes involved the same general level of money; however, it was only slightly better than EV in predicting choices between bets with the same probability of win or loss, but differing in level of money (Pruitt, 1962).

Edwards proposed a model which combined subjective probability and subjective utility. This was based on the assumption that people choose among bets in order to maximize subjectively expected utility (SEU). This is expressed in the equation: $SEU = \sum_i p_i^* u_i$. The model, however, remains untested over a broad range of bets (Pruitt, 1962).

Some evidence suggests that the subjectively expected money model and the subjectively expected utility model are both good predictors of betting behavior (Edwards, 1955), although most of the recent work has focused on the latter (Edwards, 1961). However, the method of assessing utility was ambiguous and EU and SEU models cannot be compared on the basis of existing data. In addition, the predictability of the models was very weak. Even if the above criticisms are ignored, the models seem capable of predicting only about 65% of the outcomes (Pruitt, 1962).

Variance Preferences

Coombs and Pruitt (1960) have disagreed with Edwards' emphasis on subjective probability and utility, on the basis that the model increases degrees of freedom, and measurement difficulties are multiplied. Edwards' research (1953) has suggested that 50/50 bets are more preferred and bets with .75 probability of winning are avoided. Coombs and Pruitt, however, pointed out that studies of two outcome bets cannot measure variance preferences independently of probability preferences. Variance of such bets is $pq(a-b)^2$, where a and b are two outcomes, with probability p and q respectively. In research to test their model, Coombs and Pruitt found that variance preferences were less stable than probability preferences and, in general, subjects preferred greater variance for bets that contained their favorite probabilities. Slovic (1964) found the same as above, but also found subjects who had variance preferences which were stable at different probability levels and probability preferences which shifted systematically as the variance of the bets changed.

Pruitt (1962), on the basis of his earlier research with Coombs, suggested an alternative model which would take into consideration the effect of both variance and probability preferences. The model was based on two concepts: the pattern of risk and level of risk of a bet. The former is determined by the number of possible outcomes, the probability of achieving each outcome, and the ratio of outcomes to one another. Two bets have the same pattern if they have the same number of outcomes at the same probability and if the outcomes of one can be obtained by multiplying the corresponding outcomes of the other by a constant. The level of risk is the sum of the negative outcomes weighted by their respective probabilities of occurrence. These two factors were said to be perceived separately in a gambling task yet interact to determine gambling decisions.

The model has been confirmed on post-hoc data only and is limited because of a dependence on subjective measurements, so that it also suffers in its ability to make definite predictions of behavior (Kogan and Wallach, 1967d).

Achievement Motivation

Lewin (1943, 1944), stated that the weighted valence of success at a particular level of difficulty is a multiplicative function of the valence and subjective probability of success at that moment, while the weighted valence of failure at the same level is a multiplicative function of valence of future failure and the subjective probability of future failure. The choice of a particular level is determined by a combination of these valences and subjective probabilities.

Atkinson (1957), influenced by Lewin's model, has stressed six determinants that motivate risk taking behavior: (1) Motive to achieve success (M_s); (2) Motive to avoid failure (M_f); (3) Subjective probability of achieving success (P_s); (4) Subjective probability of failing ($1-P_s$); (5) Incentive value of achieving success (I_s); and (6) Incentive value of avoiding failure (I_f).

Atkinson then made two crucial assumptions: that the incentive value of achieving success is inversely related to the subjective probability of succeeding ($I_s = 1-P_s$), and that the incentive value of avoiding failure is the negative of the subjective probability of succeeding ($I_f = -P_s$). The resultant motivation was said to be a function of M_s X P_s X $(1-P_s)$ + (M_f X P_f X I_f). The prediction was made that subjects in whom the motive to achieve success is greater than the motive to avoid failure would prefer bets with intermediate probability of success, while subjects in whom the reverse is true prefer bets with a probability of success either 1 or 0. The main differences between this and the above models is that Atkinson's probability of success and incentive are interdependent, while Edwards treats them as independent and measures them separately (Feather, 1959; Kogan and Wallach, 1967d). Edwards' model thus poses a much more difficult measurement problem (Edwards, 1961).

Edwards (1962) has noted that it is possible to substitute $I_f = -P_s$ and $P_f = 1-P_s$, causing Atkinson's expression to become M_s X P_s X $(1-P_s)$ + (M_f X $[1-P_s]$ X $[-P_s]$) = $P_s(1-P_s)$ $(M_s - M_f)$, which is monotonically related to variance, $P_s(1-P_s)$ $(M_s - M_f)^2$, assuming $M_s > M_f$. Under certain conditions, therefore, Atkinson's model is predicting variance preferences.

Experimental evidence in achievement orientated skill situations have generally supported the Atkinson model, although probability preferences in strictly chance settings have led to inconsistent results (Slovic, 1964).

Empirical Success of Mathematical Models

Slovic (1964), in a review of the general area of risk taking, reached the conclusion that few generalizations can be drawn from risk studies, and a single definition of risk was not possible. Although it can be said that behavior is fairly consistent across measures which involve similar modes of risk and are related to risk taking by a similar rationale; and that every type of measurement is favorably related to some sort of independent behavioral criterion of risk taking in at least one study, there is very little evidence for convergent validity on the concept of risk.

There are several factors that are responsible for lack of convergent validity. The first and most important is the multidimensionality of risk. As shown above, expected value, variance, and probability are most likely involved. Secondly, risk in itself is a subjective concept, and a measurement of subjective factors are needed in its study. Also emotional arousal may have a strong effect on risk taking, although to date there has been little done on this problem.

Feather (1959) has pointed out that particular models work under different circumstances, and thus situational and motivational factors should be considered before a particular model is used. In a much stronger statement, Kogan and Wallach (1967d), noting the lack of

generality of the mathematical models, the inadequacies of their basic assumptions, and their lack of a priori predictability, call for a shift of emphasis to motivational, situational, and social factors. Such an orientation has, to date, been quite successful in finding consistent empirical results (Wallach and Kogan, 1964). It is this orientation that has been followed in Social Psychology when defining risk or when developing a general research strategy of risk studies.

The main problem in the area of risk taking that concerns social psychologists is the effect that groups exert on an individual's risk taking performance. Schachter (1951) found that groups tended to reject members who deviated from the mode, and they accepted those who originally held to the modal position or who accepted it on the group's recommendations The degree of this effect was dependent upon the cohesiveness of the group and the relevance of the problem for the group. Cartwright and Zander (1960) held that the group exerts pressure on members to accept the most commonly held opinion of the group. It was also found that the effect was dependent upon whether the group was group-centered (Bovard, 1951a), which, in turn, was related to the affection each member held for the other (Bovard, 1951b). This effect is explained by the fact that those groups who have a greater chance for verbal interaction increase in affection for each other (Bovard, 1953, 1956). Thus, this school of research holds that group members' positions shift to the mean or mode of the group in a risk taking situation. This position is supported by both Asch and Sherif, who have shown that individual group members shift toward the majority position in the formation of norms (Sherif, 1936), or when the majority position would have been rejected if not for the group influence (Asch, 1951).

Allport (1924) found that in estimating the pleasantness or unpleasantness of an odour or the measure of a series of weights, the judgements made in a group did not change from individual judgements for intermediate positions. Subjects who held extreme positions, however, changed to a less

extreme position when placed in a group. This regression towards the mean may occur in the same way for risky and conservative members of the group. Thus, it would be predicted that risky subjects decrease in risk, and conservative subjects increase in risk, independently of the position of other members of the group.

On the basis of such research, Lonergan and McClintock (1961) predicted that individuals gambling in a group would show less risk than when gambling alone. However, in a task in which subjects bet that a flashing light would remain on with the knowledge of an objective probability of one in six that it would remain on, it was found that subjects did not decrease in risk taking. In fact, the trend ($p < .10$) was in the opposite direction. In another study, addressing itself to the same problem, Stoner (1961) found that individual subjects who were asked to reach consensus on the "Dilemmas of Choice Questionnaire" (Wallach and Kogan, 1959), showed a significant increase in riskiness on the basis of a pretest taken a week earlier.

This effect has since been replicated in many studies and occurred in both sexes; in various occupational groups (Wallach, Kogan, and Bem, 1962; Rim, 1954b; Marquis, 1962); and in Israeli (Rim, 1963, 1964a, 1964b, 1966), American (Wallach, Kogan and Bem, 1962), and British national groups (Bateson, 1966).

Although the Dilemmas of Choice Questionnaire has been the most popular instrument to test the phenomena, the risky shift has also been found to occur when the subjects were risking the possibility of having to experience unpleasant situations (Bem, Wallach, and Kogan, 1965) and when gambling on the possibility of being able to correctly answer questions from the College Board Examinations which were answered correctly by stated

percentages of the population (Wallach, Kogan, and Bem, 1964). Pruitt and Teger (1967) found that the shift occurs when risk is defined either by probability or by variance preferences. However, Nordhøy (1962) and Rabow, Fowler, Bradford, Hofeller, and Shibuya (1966) found that, on certain items which they developed, a shift in the conservative direction occurred. This suggests that particular norms were stressed by these items which would demand a conservative shift. On the other hand, Kogan and Wallach (1967d) explain these results by claiming that the less certain item in the Nordhøy and Rabow et al. questions was not considerably of higher desirability than the pursuit of the certain item. Thus risk was not worthwhile or desirable. The only truly dissenting result is that of Hinds (1962). He found that groups do not hold more risky positions on betting problems of an advisory nature, although they do become more risky if betting their own money. However, in view of the previous research, it appears that, at least under most conditions, group discussion does tend to a risky shift.

Explanations of Risky Shift

Various explanations have been advocated to account for this increased risk taking in groups. These explanations include suggestions that risk taking is a socially desirable orientation; information about others' views or information about the tasks cause an increase in risk; others in the group will give sympathy if the riskier attempt fails causing subjects to take a riskier position; risk takers are group leaders; or there is a diffusion of responsibility in the group. The principal explanations of the risky shift will be discussed in this section.

Wallach et al. (1964) have strongly held to the position that diffusion of responsibility accounts for increased risk taking. By this they mean that an individual in a context of group discussion feels less personal responsibility for failure in the pursuit of risky opinions than he would feel if deciding alone. This explanation is closely related to hypotheses of crowd behavior (LeBon, 1895) and to Allport's (1924) theory of "an impression of universality" whereby a member within a crowd perceives that an action undertaken by the crowd receives the approval of everyone. Rettig (1966) pointed out that if diffusion is influential, group decision, rather than group discussion, is the critical factor, while Wallach and Kogan (1965) found the opposite to this. Opposing Rettig's criticism, Wallach and Kogan (1965) point out that affective bonds develop with discussion, which facilitate the effect. Wallach and Kogan are supported by Bovard's research, but their theory is contrary to the evidence that physical separation of group members during discussion does not make any difference in the shift in the risky direction (Kogan and Wallach, 1967a). In another argument against diffusion of responsibility, Bateson (1966) pointed out that the effect would not be permanent unless there was an actual cognitive change. Since diffusion of responsibility does not entail cognitive change, Wallach and Kogan's explanation seems to be refuted by their own research which found that the effect lasted for six weeks (Wallach, Kogan, and Bem, 1962). However, Wallach and Kogan still hold to their interpretation of the data and have made predictions, on the basis of their theory, of the effect discussion would have on particular personality groups (Kogan and Wallach, 1967b).

Brown (1965) suggested that moderate risk taking is a social norm

and that discussion provides information on how much risk would be acceptable. This has received support from Hinds' findings that subjects estimated that the general population would have an acceptance level of risk lower than their own. Wallach and Kogan first rejected this interpretation on the basis of research that found that knowledge of the amount of risk advocated by others in the group was unimportant (Wallach and Kogan, 1965), but Teger and Pruitt (1967) claimed that the experimental procedure which involved balloting until consensus was reached, forced the subjects toward an arithmetical compromise as a way out of an unpleasant situation. When Teger and Pruitt used three successive rounds of public balloting without a consensus requirement, they found that there was a significant risky shift. However, this was less than obtained in the conventional discussion condition. Kogan and Wallach (1967c) further tested the hypothesis by having subjects listen to taped group discussions which caused a risky shift. It was found that a risky shift occurred in listening subjects also, but again not to the extent that is normally found. Kogan and Wallach accept Brown's hypothesis as a partial explanation, but claim that the rest of the change in the risky direction is caused by a diffusion of responsibility. One might wonder, however, if both the Teger and Pruitt, and Kogan and Wallach, results could not be explained by claiming that subjects paid less attention to the procedures in these experiments.

An interpretation related to Brown's has been advanced by Bateson (1966), who suggested that increased familiarization with the problems led to reduced cautiousness in dealing with them. He found that private study of the problems led to a comparable increase in riskiness, while

no such increase came from private study of irrelevant materials. Flanders and Thistlethwaite (1967) have replicated these findings, but both Pruitt and Teger (1967) in six attempts, and Rule and Evans (1967), have failed to do so. The only conclusion that can be reached on the status of this theory is that the evidence is ambiguous.

Marquis (1962) found that subjects who advocated a risky position were rated by subjects as being more influential than other subjects. This finding has been replicated by Wallach et al. (1962). This has led to the hypothesis that riskier subjects exert more influence than do conservative ones (Rim, 1963, 1964a, 1964b, 1966). Another explanation of these results is that the riskier subjects were perceived as more influential only because of a perceived shift in their direction. In support of the latter explanation it was found that subjects actually do perceive the shift in risk, caused by group interaction (Wallach, Kogan, and Burt, 1965). Also Rabow et al. (1966) and Nordhøy (1962) found that for items on which groups shifted in the risky direction the more risky subjects were rated as more influential. However, the hypothesis has not been adequately tested in a manipulative study.*

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*Since the writing of this manuscript Wallach, Kogan and Burt (1968) have reported a study to test the relative influence of high and low risk takers on non-risk items. They found that high risk takers were more influential for female groups but not for male groups. The study, however, did not test the influence of these subjects in risk situations and cannot be considered an adequate test of the hypothesis that risk takers exert more influence on the Choice Dilemmas Scale.

It can be concluded that, at least under certain circumstances, group discussion leads to increased risk taking. One plausible explanation, that has not been adequately tested in a manipulative study, is that risky subjects exert more influence in a group situation. This hypothesis could be evaluated by an experiment testing the difference in the shift of opinion of moderate subjects in a group having a high or low risk taker.

The composition of the group, in regard to initial risk positions, has never been controlled. Wallach and Kogan indicate that group responses do not converge to the mean of the responses; however, no attempt has been made to investigate convergence to the decision most popularly advocated. Schachter (1951) and Carthwright and Zander (1960) have shown that unanimity is an important influencing factor in judgemental behavior. It was thus likely that unanimity played a large part in discussions regarding risk. For this reason the initial risk positions of the moderate subjects were also controlled.

It was hypothesized that at least two variables determine change in risk taking: (1) the composition of the group in terms of the degree of agreement among group members, and (2) characteristic level of risk taking of members comprising the group. An attempt was made to establish if conformity of extremely high or low risk takers increases with increased unanimity of the moderate subjects and/or if the high risk taker differentially influences the decisions of the moderate members of the group. An attempt was also made to establish if high and low risk takers are differentially influenced by a group that

differs from them. Based in part on Rim's work (1962, 1964a, 1964b, 1966) it was expected that high risk takers change less than low risk takers in a decision making situation.

In order to examine these problems, subjects high and low in risk taking discussed issues under conditions of varying group composition. Risk taking for critical subjects and groups was then assessed subsequent to the discussion.

METHOD

Subjects

Subjects consisted of 144 introductory psychology students at the University of Alberta, composed of 72 males and 72 females. Subjects were selected on the basis of risk taking scores from a scale developed by Wallach and Kogan (1959). Two criteria were used for selection. Critical subjects were categorized as high risk takers and low risk takers (1) on the basis of choosing on a critical item in the scale, a 1/10 probability of success before advising a risky choice (high risk taker), or a 9/10 probability of success (low risk taker); and (2) on the basis of placement in the upper and lower 1/3 of the overall scores. Other subjects, serving as members of the experimental groups, were selected from a moderate risk taking category and on the basis of a choice on a critical item of the scale of an intermediate probability of success.

Materials

The Wallach and Kogan questionnaire consists of 12 items, described to subjects as an "Opinion Questionnaire". The items were hypothetical risk situations in which the subjects indicate the lowest probability of success necessary before they would advise a hypothetical person to take the riskier course of action. The range of probability extends from 1/10 through 9/10. Appendix A contains the 12 items. A sample follows:

> Mr. G., a competent chess player, is participating in a national chess tournament. In an early match he draws the top favored player in the tournament as his opponent. Mr. G. has been given a relatively low ranking in view of his performance in previous tournaments. During the course of his play with the top favored man, Mr. G. notes the possibility of a deceptive

though risky maneuver which would bring him a quick victory. At the same time, if the attempted maneuver should fail, Mr. G. would be left in an exposed position and defeat would almost certainly follow.

Imagine that you were advising Mr. G. Listed below are several probabilities of odds that Mr. G.'s deceptive play would succeed. Please indicate the lowest probability that you would consider acceptable for the risky play in question to be accepted.

_____The chances are 1 in 10 that the play would succeed.

. . . . . .

. . . . . .

_____The chances are 9 in 10 that the play would succeed.

_____Please check here if you think Mr. G. should not attempt the risky play, no matter what the probabilities.

The overall risk taking score was derived by summing the scores for the separate items, so that the larger the subject's score, the greater was his conservatism. The selection of the position advocating that the hypothetical subject not attempt the risky play, no matter what the probabilities, was scored as 10.

Wallach, Kogan and Bem (1962) report a split-half Spearman-Brown Reliability Coefficient ranging from .53 to .80 for various age and sex samples, suggesting satisfactory internal consistency. For 24 male subjects, the product-moment correlation coefficient between total conservatism scores in the first and second sessions, separated by one week, is .78. For 27 female subjects, the same correlation was .82.

In support of construct validity the questionnaire has yielded findings consistent with a risk taking interpretation. It has been found that degree of conservatism as measured with the present instrument increases with age from young adulthood to old age for both males and females, and increases with degree of subjective probability of personal failure in a motor skill game with actual motor skill

controlled (Wallach et al., 1962).

Procedure

Introductory students in psychology were administered the Choice Dilemmas Questionnaire, among a battery of tests given at the beginning of the academic year. According to the scores on this pretest, the subjects were placed in one of six groups for each of the six conditions. In each condition there were three groups composed of all females and three of all males. Groups varied in terms of risk taking level of subjects and positions on item number four of the Choice Dilemmas Questionnaire. This item had been chosen because of the wide diversion of opinion that it had elicited. The critical item involved the captain of a college football team, who in the final seconds of a game with the college's traditional rival, must choose between a play that would lead to sure victory if successful, but sure defeat if not. On this item critical subjects had accepted a 1 in 10 position and were already in the upper 1/3 of the risk taking distribution, or they had accepted a 9/10 position and were in the lower 1/3 of the risk taking distribution. The rest of the group was composed of moderate risk takers, chosen from the middle 1/3 of the risk taking distribution.

In addition, unanimity with respect to the position advocated on the critical item was varied. The groups were composed according to these criteria: (B_1) Subjects two units, three units, and four units from the critical subject; (B_2) Three subjects three units from the critical subject; and (B_3) Two subjects two units and one five units from the critical subject (Table 1). In this way the mean and distance of the mean from the critical subject was controlled (Allen,

TABLE 1

GROUP COMPOSITION ON CRITICAL ITEM

	Group B_1	Group B_2	Group B_3
A_1 - High Risk Taker	3/10, 4/10, 5/10	4/10, 4/10, 4/10	3/10, 3/10, 6/10
A_2 - Low Risk Taker	7/10, 6/10, 5/10	6/10, 6/10, 6/10	7/10, 7/10, 4/10

1965; Rule, 1964; Rule and Renner, 1966).

The subjects were contacted by telephone and were asked to participate in a psychological experiment, to receive credit in their psychology courses. Subjects were led into a room having a table surrounded by four chairs. After the subjects were seated they were asked to quickly review each item of the "Opinion Questionnaire" that they had filled out a short while ago. This was intended to remind the subjects of the context of the items and also to reinstate their former positions. The following instructions, based on those used by Wallach and Kogan (1965), were then read to them by the male experimenter:

> We had each of you fill out the questionnaire the first time in order to find out how much agreement there was among the students in the various situations described. What we are really interested in is having you discuss each of the situations as a group. Let me now describe the purpose of these discussions. We are trying to develop a set of case materials for a human relations course. This means that we would like to develop situations for which people are likely to hold many different points of view. We want to see whether the situations we constructed will generate a diversity of opinion, so your discussions will tell us how well the different situations are working for our purposes. You will have five minutes to discuss each situation. I am not going to participate in the discussion although I will be here to answer any procedural questions that may arise. Also a record will be kept of what goes on in the discussion.
>
> Because of the time it takes to discuss all of the items, various ones have been chosen at random for different groups. Also because of different effects that might occur because of the order in which the items are presented, the order of the items has also been randomized. For this reason you will begin discussion on the sixth item.
>
> You will also find new copies of the questionnaire on the table. Would you please use this copy for the rest of the experiment, without consulting your other copy.
>
> All right, would you please begin discussion on the sixth item, on page seven.

Pilot work had shown that discussion on one item was often necessary before subjects were sure of what was expected of them, and before they all became involved in the discussions. For this reason subjects were asked to discuss the sixth item before they discussed the critical item.

The six items chosen were those used by Marquis (1962). Their selection was made on the basis of correlations with the total test scores. These items, and the order in which they were presented, were numbers 6, 4, 11, 3, and 1 of the original questionnaire. After five minutes had passed the experimenter broke into the conversation with the following instruction:

> All right that was good. For some of you the discussion may have raised issues that you had overlooked when filling out the questionnaire individually. Now we would like to find out whether the discussion influenced your judgement in any way. When making your decision now, don't feel bound by what you did when filling out the questionnaire the first time. We're not interested in your prior opinion, but rather in just how you feel about the situation now. If you still feel the same way, that's quite all right, but we would like you to consider each situation in the light of the discussion. As I told you before, we're interested in seeing how diversity of opinion is generated by each situation. The expression of such diversity should have some impact on everyone's personal opinions. All right, go ahead and make your decision on the sixth situation--the one that you have just discussed--and I will ask you to do this for each item hereafter.
>
> Now would you please turn to the fourth item on page five. All right, would you please begin discussion on this item.

After each subsequent discussion the experimenter asked the subjects to indicate their positions and then told them what item would be discussed next. During the discussions, the experimenter sat at a desk in the corner of the experimental room, keeping account of the number of times each subject spoke. He took no part in the conversation except when a subject asked him a direct question. In this

case he directed the subject back to the questionnaire if it pertained to the subject matter of the item. If a procedural question was asked, he would answer it as quickly as possible.

RESULTS

A comparison of the pre-test scores with the post-discussion scores on the overall scale indicated a shift in the risky direction ($t = 9.70$, $p < .01$).[1] These results replicate previous findings in the area.

To examine the degree to which moderate subjects were influenced by the critical subjects, two analyses were performed. The degree of shift of the moderate subjects toward the critical subjects was computed by assigning the difference between the pre- and post-discussion scores of the moderate subjects a plus sign if the difference was in the direction of the critical subject and a minus sign if the difference was a shift away from the critical subject. Analysis of variance showed on both the critical item ($F = 42.88$, d.f. = 1/96, $p < .01$) and the overall scale ($F = 43.06$, d.f. = 1/32, $p < .01$) that there was a difference between the two groups. Tables I and II of Appendix C present the summary of the analysis of variance for the critical item and the overall scale respectively. The mean shift toward the critical subject was 1.2 and -1.2 on the critical item and 5.9 and -4.0 on the overall scale for high and low risk takers respectively. In the high risk taker condition the moderate subjects moved closer to the critical subjects than in the low risk taker condition.

The second analysis was performed on the increase in risk taking score for the moderate subjects. This score was computed by subtracting

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[1] Appendix B contains the increase in risk scores for each subject.

the pre-test score from the post-discussion score. The manipulation was equivalent to converting the signs of the scores of the first analysis in the low risk taker condition. When this measure was used there was no significant difference between the two groups (Table III, Appendix C). On the critical item, both groups resulted in the same amount of shift in the risky direction with an F of 0.002. (See Table IV of Appendix C for analysis of the overall scale scores.) Since the shift is no different for moderates under either condition, the theory that it is the riskier subjects who cause the shift may be called into question.

To examine the second hypothesis regarding the composition of the group in terms of the degree of agreement among group members, two analyses were done. When increase in risk taking was computed for the critical subjects, it was found that the difference between high and low risk takers was significant for both critical item ($F = 58.99$, d.f. $= 1/24$, $p < .01$) and overall scale ($F = 24.90$, d.f. $= 1/32$, $p < .01$). The analyses of variance are contained in Tables V and VI of Appendix C. The mean differences are shown in Table 2. These results support Rim's work (Rim, 1962, 1964a, 1964b, 1966) which suggests that high and low risk takers are differentially influenced by a group that differs from them.

On the critical item it was found that there was an interaction between the group composition and the position of the critical subjects ($F = 3.50$, d.f. $= 2/24$, $p < .05$). From Figure 1 it can be seen that the low risk takers showed the highest increase in risk taking in the presence of the unanimous group, while the high risk takers showed the lowest increase in risk taking. This supports the hypothesis that the

TABLE 2

MEAN INCREASE IN RISK TAKING FOR CRITICAL Ss

	High Risk Taker	Low Risk Taker
Critical Item	-.72	3.5
Overall Scale	-1.3	10.9

(N = 18 in each cell)

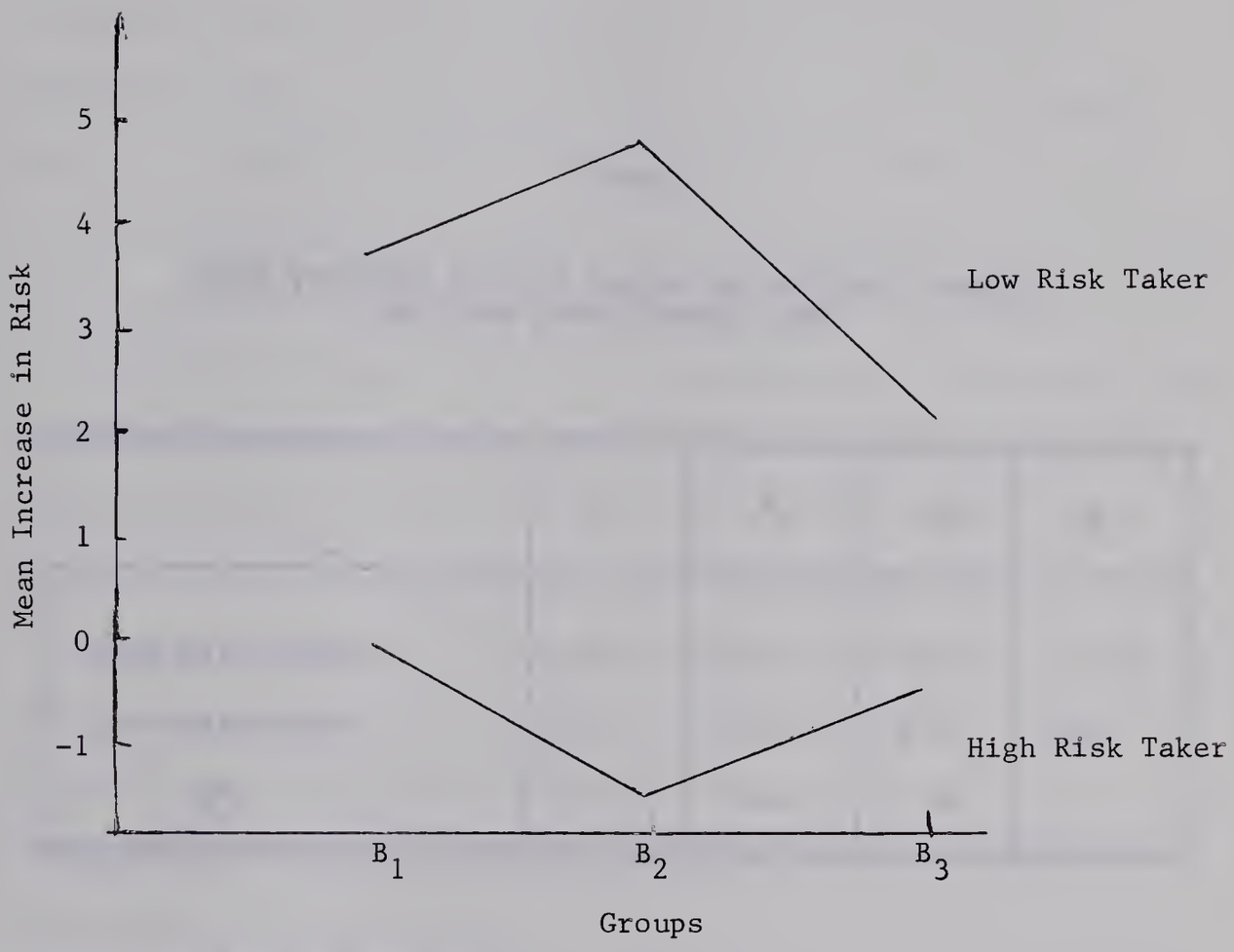


Fig. 1. Mean increase in risk taking for risky and conservative subjects according to group compostition

Distance of moderate subjects from critical subjects:
B_1 - 2, 3, 4 units
B_2 - 3, 3, 3 units
B_3 - 2, 2, 5 units

TABLE 3

MEAN INCREASE IN RISK TAKING OF CRITICAL SUBJECTS
FOR EACH GROUP COMPOSITION

	B_1	B_2	B_3	Σ
High Risk Takers	-.17	-1.5	-.5	-.72
Low Risk Takers	3.7	4.7	2.2	3.5
Σ	1.7	1.6	.85	

(n = 6 in each cell)

unanimous group causes the greater shift in its own direction.

Since it was felt that the high risk taker's lack of change could be due to a ceiling effect, a second analysis was performed. This was done by computing the difference between the pre- and post-discussion scores. A minus was assigned to the score of the risky subject if he moved in the conservative direction, while the score was given a plus sign if he moved in the risky direction and vice-versa for the conservative subjects. Analysis of variances (Tables VII and VIII, Appendix C) showed that the conservative subjects moved away from their former positions much more than did the risky subjects on both the critical item ($F = 25.51$, d.f. = 1/24, $p < .01$) and the overall scale ($F = 15.23$, d.f. = 1/32, $p < .01$). These differences are shown on Table 4. On the critical item there was also a significant difference in the change scores of the critical subjects from their original positions due to differences in the group composition ($F = 3.50$, d.f. = 2/24, $p < .05$). A Duncan's Test showed that group B_2 in which the moderate subjects were unanimous in their positions, differed significantly from both groups B_1 and B_3, which did not differ from each other. The order of the groups was B_3, the most dispersed group causing the smallest amount of change, B_1, and B_2, the least dispersed group which caused the largest amount of change (Table 5).

In order to assess talking as a means of influence, the experimenter marked each time each individual started to speak during group discussion. From these data three general scores were obtained: (1) the number of times each individual started to speak, (2) the total number of times the four members in each group started to speak, and (3) the number of

TABLE 4

MEAN CHANGE SCORES FOR CRITICAL Ss

	High Risk Taker	Low Risk Taker
Critical Item	-.72	-3.5
Overall Scale	-1.3	-10.9

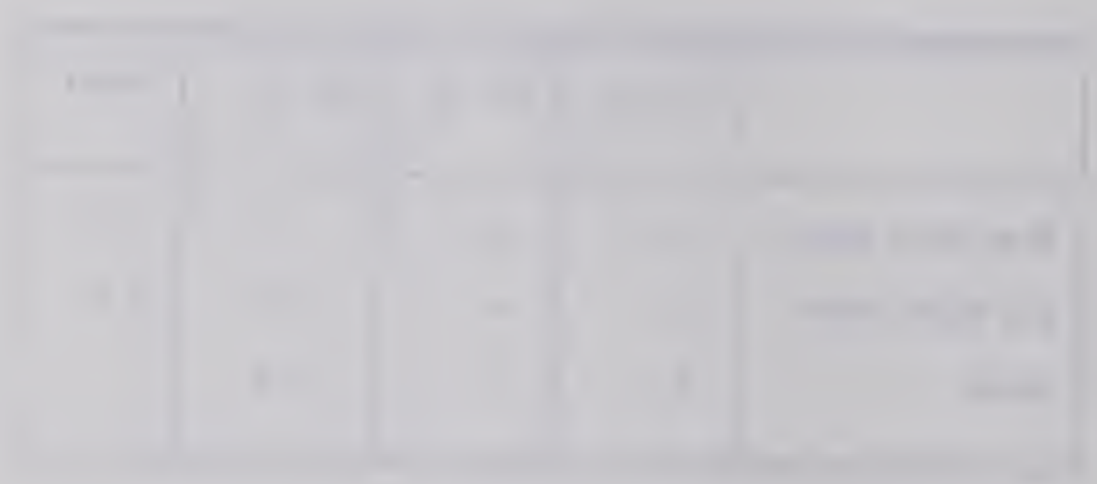
(n = 18 in each cell)

TABLE 5

MEAN CHANGE SCORE FOR CRITICAL SUBJECTS ON CRITICAL ITEM

	Gp. B_1	Gp. B_2	Gp. B_3	Total
High Risk Taker	.17	1.5	.5	.72
Low Risk Taker	3.7	4.7	2.2	3.5
Total	1.9	3.1	1.3	

($\dot{n}$ = 6 in each cell)



times each individual initiated conversation subtracted from the total number of times the four members in the group started to speak. The last score was computed to consider the influence of talking on each individual. Correlations were computed among these three scores and also between them and the individual and the group increase in risk on both the critical item and the overall scale. Thus the matrices following have 5 variables which allowed the computation of 11 correlational scores.

For all subjects (n = 144) on both the overall scale (Table I, Appendix D) and the critical item (Table II, Appendix D), a positive correlation was found between the individual talking and the group minus the individual talking (Overall Scale - $r = .47$, $p < .01$; Critical Item - $r = .58$, $p < .01$). This correlation suggests a social facilitation effect (Allport, 1924). Evendence suggesting the importance of conformity and the material discussed was found in a correlation between group change and group talking (Overall Scale - $r = .24$, $p < .05$; Critical Item - $r = .22$, $p < .05$).

In order to assess the relationships between various factors for risky, conservative, and moderate subjects, moderator analyses were performed for these three groups separately. For each of these groups correlational matrices on the same 5 variables as were examined for all subjects are presented (Tables III, IV, V, VI, VII, VIII, Appendix D). On each of the six analyses a similar correlation between the individual talking and the group minus the individual talking, suggesting a social facilitation effect, was found as in the matrices based on all subjects.

In addition, on the critical item there was a high correlation

between individual change and group change for both conservative ($r = .88$, $n = 18$, $p < .01$) and the risky groups ($r = .92$, $n = 18$, $p < .01$). However, on the overall scale such a high correlation was found only for the conservative ($r = .64$, $n = 18$, $p < .01$) and the moderate subjects ($r = .60$, $n = 108$, $p < .01$). These data suggest that conservative and moderate subjects were strongly influenced toward a change in opinion when a decision to change opinion is made by other members in the group. It should be noted, however, that overall the high risk taker changed less and hence correlations on these subjects were spuriously reduced.

Other significant correlations were found in the risky groups. On the overall scale (Table IV, Appendix C) there was a correlation between group change and the risky individual talking ($r = .44$, $n = 18$, $p < .05$). On the critical item (Table VII, Appendix C) there was a correlation between the risky individual's change and the group talking minus the individual talking ($r = .40$, $n = 18$, $p < .05$).

DISCUSSION

Studies in the area of group decision making under risk conditions have supported the conclusion that group members tend to shift in the risky direction. Various explanations have been offered to account for this risky shift. The most popular explanations are (1) the high risk takers exert more influence on the group, (2) there is a diffusion of responsibility, or (3) group discussion leads to knowledge that increases acceptance of the risky position. Each of these explanations has indirect empirical support, although in all cases support cannot be considered adequate.

The research reported here attempted to test the notion that high risk takers exert more influence on a group than do low risk takers. The results did not support this explanation and suggested that a risky shift occurs regardless of the initial position of the members of the group. Earlier results suggested that high risk takers are perceived as more influential because of a perceived shift in their direction (Wallach, Kogan, and Burt, 1965). There is a possibility that the high risk takers exerted more influence as the discussion progressed, and the group began to perceive the shift in the risky person's direction. If this is the case, it might be expected that the high risk taker has more influence on the later items than on the earlier ones. Inspection of the data did not support this hypothesis (Table IX, Appendix C). Perception of influence was not tested in this experiment, but it might be assumed from earlier research that the high risk taker is perceived as more influential (Marquis, 1962; Wallach et al., 1962). It appears,

however, that perception of the risky person as more influential does not allow him to exert any more actual influence on the group.

Wallach and Kogan's research has shown that the group does not shift to the mean of the individuals' decisions, but little attention has been paid to the importance of the group processes underlying conformity in group risk taking. Results from this experiment suggest that the process causing a risky shift following group discussion is influenced by the degree of unanimity among the members of the group. Evidence was also found that high risk takers are less influenced than are low risk takers, although it is likely that this is caused by conformity to the risky shift of the moderate subjects in the group. Since other subjects in the group are shifting in the risky direction, the high risk takers will not move in the conservative direction, and a ceiling effect prevents him from becoming more risky. Support for the conclusion that conformity pressures are operating on the high risk taker is found in the fact that risky individuals were influenced by a unanimous opinion of the moderate subjects. These results suggest that more empirical work in group risk taking should examine the influence of the subjects, relative position in the group.

The above results may be explained by either the diffusion of responsibility or the information explanation. The diffusion of responsibility explanation, however, is not able to explain both correlations between the risky individual's change and the group talking minus that individual's talking on the critical item ($r = .40$, $n = 18$, $p < .05$) and between group change and the risky individual's talking on the overall scale ($r = .44$, $n = 18$, $p < .05$). Since the risky

individual is not able to increase in risk on the critical item, the prior correlation means that the less the group talked the more the risky individual shifted in the conservative direction. This would suggest that the less information that is supplied by talking, the less likely the risky shift is to occur. The latter correlation suggests that if the risky individual is able to supply information supporting his position he has an effect on the group. Thus if information is available, through talking, it would tend to cause the risky shift. This is especially evident if the information is supplied by one who would tend to support the risky shift. These correlations suggest that the group effects are not caused by affective bonds developed by talking, but by information supplied by group conversation.

The above data suggest that information is the factor causing a risky shift. This, however, cannot be accepted as a full explanation since the question arises as to what type of information causes the observed phenomena. The lack of success in finding an adequate explanation for the risky shift in group decision making under risk conditions suggest that a new approach is needed to the study of group decision making. Examination of research in the area of the mathematical models suggests that more exact definitions might be possible in future research on the group influence on risky decisions. If such variables as probability and variance preferences were examined a more adequate test of the underlying processes of group risk taking might be possible. Kogan and Wallach (1967) have criticized research on the mathematical models; however, their own research has not been successful in explaining

observed phenomena. A more profitable strategy might be a combination of both approaches. This would mean that the influence of motivational, situational, and social factors on variables similar to those developed in the mathematical models, could be considered. Feather (1959) has already suggested a similar approach. Such research might allow for improvement in the predictability of the mathematical models, and answer the problems regarding the underlying processes of the phenomena revealed by approaches similar to Wallach and Kogan's.

A means to combine these two approaches is suggested by the correlational data of this study. These correlational data were presented to examine the importance of talking as an influencing factor. Results from these data suggest that it may be more profitable to attempt another similar influence measure. Such a measure would examine the content of the conversation and the length of time each individual spoke (Bales, 1951; Bass, 1949). An examination of the content of the conversation would reveal the types of social interaction that takes place and their influence upon the decision maker. Also an operational definition of variance and probability preferences would allow for an examination of the relative influence of these variables on decision making. This could be done by a system of categorizing the content of the conversation such that discussion encouraging particular types of action could be separated into meaningful categories. A similar approach has already been developed by Bales (1950) to categorize social interaction, although such a system is relatively impotent unless it is combined with some measure of the content of the conversation. The proposed

system of categorizing information would be able to measure the amount of information emphasizing the positive and negative aspects of the prize and of the stake. Combined with Bales' system, it would be possible to obtain some measurement of the relative reinforcement of each of these factors. A moderator analysis, separating subjects on initial positions on relevant topics and/or personality variables would allow examination of influence, influencability, and other hypothesized processes underlying group decision making.

Research of this type would allow an examination of the importance of the concepts developed by the mathematical models. For example, what is it that occurs in the conversation that causes the risky shift: is it a reevaluation of the subjective probabilities, utilities, or a change in the perception of variance? Or is it some combination of all of these? The only way that these questions could be tested is through the development of more adequate scales, developed with reference to these concepts, and through the development of methods to test the content, type, and patterns of communication within the conversation.

The results from this experiment suggest that future research in the area of group decision making under risk conditions should attempt to clarify the importance of conventional concepts of both the mathematical models and the general area of social psychology. Such an emphasis would stress the concepts of leadership, social facilitation, and conformity; and consider the influence of such variables as probability and variance preferences. In order to do this, more precise scaling techniques would be needed and more manipulative experimentation should be done.

REFERENCES

Allen, V. L., Situational factors in conformity, In L. Berkowitz (Ed.) Advances in experimental social psychology, Vol. 2. New York: Academic Press, 1965, pp. 133-175.

Allport, F. Social psychology. New York: Houghton-Mifflin, 1924.

Asch, S. E. Effects of Group Pressure upon the Modification and Distortion of Judgements. In H. Guetzkow (Ed.), Groups, leadership and men Pittsburg: Carnegie Press, 1951.

Atkinson, J. W. Motivational determinants of risk-taking behavior. Psychol. Rev., 1957, 64, 259-372.

Bales, R. F., Interaction process analysis: a method for the study of small groups. Cambridge, Mass.: Addison Wesley Press, 1950.

Bales, R. F., Strodtbeck, F. L., Mills, T. M., & Roseborough, M. E. Channels of communication in small groups, Amer. Sociol. Rev., 1951, 16, 461-468.

Bass, B. M. An analysis of leaderless group discussion. J. appl. Psychol., 1949, 33, 527-533.

Bateson, N. Familiarization, group discussion, and risk taking. J. exp. soc. Psychol., 1966, 2, 119-129.

Bem, D. J., Wallach, M. A., and Kogan, N. Group decision making under risk of adversive consequences. J. pers. soc. Psychol., 1965, 1, 453-460.

Bernoulli, D. Specimen theoriae novae de mensura sortis. Comentarii Academiae Scientiarum Imperialis Petropolitanae, 1738, 5, 175-192. (Trans. by Sommer in Econometrica, 1954, 22, 23-36.

Bovard, E. W., Jr. Group structure and perception, J. abnorm. soc. Psychol., 1951a, 46, 398-405.

_____The experimental production of interpersonal affect, J. abnorm. soc. Psychol., 1951b, 46, 521-528.

_____Conformity to group norms and attraction to groups. Science, 1953, 118, 598-599.

_____Interaction and attraction to the group, Human Relat., 1956, 9, 481-489.

Brown, R. Social psychology. New York: Free Press, 1965.

Carthwright, D., and Zander, A. (Eds.) Group dynamics. New York: Harper and Row, 1960.

Coombs, C. H. and Pruitt, D. G. Components of risk in decision making: Probability and variance preferences. J. exp. Psychol., 1960, 60, 265-277.

Edwards, W. Probability preferences in gambling. Amer. J. Psychol., 1953, 66, 349-364.

_____. The prediction of decisions among bets. J. exp. Psychol., 1955, 51, 201-214.

_____Behavioral decision theory. Ann. Rev. Psychol., 1961, 12, 473-498.

_____Utility, Subjective Probability, their interaction, and variance preferences, J. of Conflict Resolution, 1962, 6, 42-51. Reprinted in T. W. Costello & S. S. Zalkind, Psychology in administration Prentice-Hall, Inc., 1963.

Feather, N. T. Subjective probability and decision under uncertainty. Psychol. Rev., 1959, 66, 150-164.

Hinds, W. C. Individual and group decisions in gambling situations. Unpublished Master's thesis, School of Industrial Management, Massachusetts Institute of Technology, 1962.

Kogan, K. and Wallach, M. A. Risk taking: a study in cognition and personality. New York: Holt, Rinehart and Winston, 1964.

Kogan, N., and Wallach, M. A. Effects of physical separation of group members upon group risk taking. Hum. Relat., 1967a, 20, 41-48.

_____Group risk taking as a function of members' anxiety and defensiveness levels. J. Pers., 1967b, 35, 50-63.

_____The risky-shift phenomenon in small decision making groups: A test of the information-exchange hypothesis. J. exp. soc. Psychol., 1967c, 3, 75-84.

_____Risk taking as a function of the situation, the person and the group. In G. Mandler et al. New directions in psychology III. New York: Holt, Rinehart and Winston, 1967d.

LeBon, G. The Crowd. New York: The Macmillan Company, 1938.

Lewin, K. Defining the "field at a given time". Psychol. Rev., 1943, 50, 292-310.

Lewin, K., Dembo, T., Festinger, L., & Sears, P. S. Level of aspiration. In J. McV. Hunt (Ed.) Personality and the behavior disorders. New York: Ronald Press, 1944, pp. 333-378.

Lonergan, B. G., and McClintock, C. G. Effects of group membership on risk-taking behavior. Psychol. Rep., 1961, 8, 447-455.

Marquis, D. G. Individual responsibility and group decisions involving risk. Industr. Mgmt. Rev., 1962, 3, 8-23.

Nordhøy, F. Group interaction in decision-making under risk. Unpublished Master's thesis, Massachusetts Institute of Technology, School of industrial management, 1962.

Preston, M. G., and Baratta, P. An experimental study of the auction value of an uncertain outcome. Amer. J. Psychol., 1948, 61, 183-193.

Pruitt, D. G. Pattern and level of risk in gambling decisions. Psychol. Rev., 1962, 69, 187-201.

Pruitt, D. G. and Teger, A. I. Is there a shift toward risk in group discussion? If so, is it a group phenomenon? If so, what causes it? 1967 APA Convention Paper.

Rabow, J., Fowler, F. J., Bradford, D. L., Hofeller, M. A., & Shibuya, Y., The role of social norms and leadership in risk-taking. Sociometry, 1966, 29, 16-27.

Rettig, S. Group discussion and predicted ethical risk taking. J. pers. soc. Psychol., 1966, 3, 629-633.

Rim, Y. Risk taking and need for achievement. Acta Psychologica, 1963. 21, 108-115.

_____Personality and group decisions involving risk. Psychol. Rec., 1964a, 14, 37-45.

_____Social attitudes and risk-taking. Hum. Relat., 1964b, 17, 259-265.

_____Machiavellianism and decisions involving risk. Brit. J. soc. clin. Psychol., 1966, 5, 30-36.

Rule, B. G. Group effects on deviant behavior. Psychol. Reports, 1964. 15, 611-614.

Rule, B. G. and Evans, J. Familiarization, social facilation, and group discussion effects on risk taking. In preparation.

Rule, B. G. and Renner, J. Distance, group dispersion and opinion change. Psychol. Rep., 1965, 17, 777-778.

Schachter, S. Deviation, rejection, and communication. J. abnorm. soc. Psychol., 1951, 46, 190-207.

Sherif, M. Formation of social norms: the Experimental Pardigm. In H. Proshansky and B. Seidenberg (Ed.), Basic studies in social psychology. New York: Holt, Rinehart and Winston, 1966.

Slovic, P. Assessment of risk-taking behavior. Psychol. Bull., 1964, 61, 220-233.

Stoner, J. A. F. A comparison of individual and group decisions involving risk. Unpublished Master's thesis, School of Industrial Management, Massachusetts Institute of Technology, 1961.

Teger, A. I., and Pruitt, D. G. Components of group risk taking. J. exp. soc. Psychol., 1967, 3, 189-205.

Wallach, M. A. and Kogan, N. Sex differences and judgement processes. J. Personal., 1959, 27, 555-564.

_____The roles of information, discussion, and consensus in group risk taking. J. exp. soc. Psychol., 1965, 1, 1-19.

Wallach, M. A., Kogan, K., & Bem, D. J. Group influence on individual risk taking. J. abnorm. soc. Psychol., 1962, 65, 75-86.

_____Diffusion of responsibility and level of risk taking in groups. J. abnorm. soc. Psychol., 1964, 68, 263-274.

Wallach, M. A., Kogan, K., Burt, R. B. Can group members recognize the effects of group discussion upon risk taking? J. exp. soc. Psychol., 1965, 1, 379-395.

_____Are risk takers more persuasive than conservatives in group discussion. J. exp. soc. Psychol., 1968, 4, 76-88.

A P P E N D I C E S

A P P E N D I X A

CHOICE DILEMMAS QUESTIONNAIRE

Opinion Questionnaire I

Instructions

On the following pages, you will find a series of situations that are likely to occur in everyday life. The central person in each situation is faced with a choice between two alternative courses of action, which we might call X and Y. Alternative X is more desirable and attractive than alternative Y, but the probability of attaining or achieving X is less than that of attaining or achieving Y.

For each situation on the following pages, you will be asked to indicate the minimum odds of success you would demand before recommending that the more attractive or desirable alternative, X, be chosen.

Read each situation carefully before giving your judgment. Try to place yourself in the position of the central person in each of the situations. There are twelve situations in all. Please do not omit any of them.

1. Mr. A., an electrical engineer, who is married and has one child, has been working for a large electronics corporation since graduating from college five years ago. He is assured of a lifetime job with a modest, though adequate, salary, and liberal pension benefits upon retirement. On the other hand, it is very unlikely that his salary will increase much before he retires. While attending a convention, Mr. A. is offered a job with a small, newly founded company which has a highly uncertain future. The new job would pay more to start and would offer the possibility of a share in the ownership if the company survived the competition of the larger firms.

   Imagine that you are advising Mr. A. Listed below are several probabilities or odds of the new company's proving financially sound. PLEASE CHECK THE LOWEST PROBABILITY THAT YOU WOULD CONSIDER ACCEPT-ABLE TO MAKE IT WORTHWHILE FOR MR. A. TO TAKE THE NEW JOB.

____The chances are 1 in 10 that the company will prove financially sound.

____The chances are 2 in 10 that the company will prove financially sound.

____The chances are 3 in 10 that the company will prove financially sound.

____The chances are 4 in 10 that the company will prove financially sound.

____The chances are 5 in 10 that the company will prove financially sound.

____The chances are 6 in 10 that the company will prove financially sound.

____The chances are 7 in 10 that the company will prove financially sound.

____The chances are 8 in 10 that the company will prove financially sound.

____The chances are 9 in 10 that the company will prove financially sound.

____Place a check here if you think Mr. A. should <u>not</u> take the new job no matter what the probabilities.

2. Mr. B., a 45-year old accountant, has recently been informed by his physician that he has developed a severe heart ailment. The disease would be sufficiently serious to force Mr. B. to change many of his strongest life habits -- reducing his work load, drastically changing his diet, giving up favorite leisure time pursuits. The physician suggests that a delicate medical operation could be attempted which, if successful, would completely relieve the heart condition. But its success could not be assured, and in fact, the operation might prove fatal.

   Imagine that you are advising Mr. B. Listed below are several probabilities or odds that the operation will prove successful.

   PLEASE CHECK THE LOWEST PROBABILITY THAT YOU WOULD CONSIDER ACCEPTABLE FOR THE OPERATION TO BE PERFORMED.

____Place a check here if you think Mr. B. should not have the operation no matter what the probabilities.

____The chances are 9 in 10 that the operation will be a success.

____The chances are 8 in 10 that the operation will be a success.

____The chances are 7 in 10 that the operation will be a success.

____The chances are 6 in 10 that the operation will be a success.

____The chances are 5 in 10 that the operation will be a success.

____The chances are 4 in 10 that the operation will be a success.

____The chances are 3 in 10 that the operation will be a success.

____The chances are 2 in 10 that the operation will be a success.

____The chances are 1 in 10 that the operation will be a success.

3. Mr. C., a married man with two children, has a steady job that pays him about $6000 per year. He can easily afford the necessities of life, but few of the luxuries. Mr. C.'s father, who died recently, carried a $4000 life insurance policy. Mr. C. would like to invest this money in stocks. He is well aware of the secure "blue-chip" stocks and bonds that would pay approximately 6% on his investment. On the other hand, Mr. C. has heard that the stocks of a relatively unknown Company X might double their present value if a new product currently in production is favorably received by the buying public. However, if the product is unfavorably received, the stocks would decline in value.

Imagine that you are advising Mr. C. Listed below are several probabilities or odds that Company X stocks will double their value. PLEASE CHECK THE LOWEST PROBABILITY THAT YOU WOULD CONSIDER ACCEPTABLE FOR MR. C. TO INVEST IN COMPANY X STOCKS.

____The chances are 1 in 10 that the stocks will double their value.

____The chances are 2 in 10 that the stocks will double their value.

____The chances are 3 to 10 that the stocks will double their value.

____The chances are 4 to 10 that the stocks will double their value.

____The chances are 5 to 10 that the stocks will double their value.

____The chances are 6 to 10 that the stocks will double their value.

____The chances are 7 to 10 that the stocks will double their value.

____The chances are 8 to 10 that the stocks will double their value.

____The chances are 9 to 10 that the stocks will double their value.

____Place a check here if you think Mr. C. should not invest in Company X stocks, no matter what the probabilities.

4. Mr. D. is the captain of College X's football team. College X is playing its traditional rival, College Y, in the final game of the season. The game is in its final seconds, and Mr. D.'s team, College X, is behind in the score. College X has time to run one more play. Mr. D., the captain, must decide whether it would be best to settle for a tie score with a play which would be almost certain to work; or, on the other hand, should he try a more complicated and risky play which could bring victory if it succeeded, but defeat if not.

Imagine that you are advising Mr. D. Listed below are several probabilities or odds that the risky play will work.

PLEASE CHECK THE LOWEST PROBABILITY THAT YOU WOULD CONSIDER ACCEPTABLE FOR THE RISKY PLAY TO BE ATTEMPTED.

____Place a check here if you think Mr. D. should not attempt the risky play no matter what the probabilities.

____The chances are 9 in 10 that the risky play will work.

____The chances are 8 in 10 that the risky play will work.

____The chances are 7 in 10 that the risky play will work.

____The chances are 6 in 10 that the risky play will work.

____The chances are 5 in 10 that the risky play will work.

____The chances are 4 in 10 that the risky play will work.

____The chances are 3 in 10 that the risky play will work.

____The chances are 2 in 10 that the risky play will work.

____The chances are 1 in 10 that the risky play will work.

5. Mr. E. is president of a light metals corporation in the United States. The corporation is quite prosperous, and has strongly considered the possibilities of business expansion by building an additional plant in a new location. The choice is between building another plant in the U.S., where there would be a moderate return on the initial investment, or building a plant in a foreign country. Lower labor costs and easy access to raw materials in that country would mean a much higher return on the initial investment. On the other hand, there is a history of political instability and revolution in the foreign country under consideration. In fact, the leader of a small minority party is committed to nationalizing, that is, taking over, all foreign investments.

Imagine that you are advising Mr. E. Listed below are several probabilities or odds of continued political stability in the foreign country under consideration.

PLEASE CHECK THE LOWEST PROBABILITY THAT YOU WOULD CONSIDER ACCEPTABLE FOR MR. E.'S CORPORATION TO BUILD A PLANT IN THAT COUNTRY.

____The chances are 1 in 10 that the foreign country will remain politically stable.

____The chances are 2 in 10 that the foreign country will remain politically stable.

____The chances are 3 in 10 that the foreign country will remain politically stable.

____The chances are 4 in 10 that the foreign country will remain politically stable.

____The chances are 5 in 10 that the foreign country will remain politically stable.

____The chances are 6 in 10 that the foreign country will remain politically stable.

____The chances are 7 in 10 that the foreign country will remain politically stable.

____The chances are 8 in 10 that the foreign country will remain politically stable.

____The chances are 9 in 10 that the foreign country will remain politically stable.

____Place a check here if you think Mr. E.'s corporation should not build a plant in the foreign country, no matter what the probabilities.

6. Mr. F. is currently a college senior who is very eager to pursue graduate study in chemistry leading to the Doctor of Philosophy degree. He has been accepted by both University X and University Y. University X has a world-wide reputation for excellence in chemistry. While a degree from University X would signify outstanding training in this field, the standards are so very rigorous that only a fraction of the degree candidates actually receive the degree. University Y, on the other hand, has much less of a reputation in chemistry, but almost everyone admitted is awarded the Doctor of Philosophy degree, though the degree has much less prestige than the corresponding degree from University X.

Imagine that you are advising Mr. F. Listed below are several probabilities or odds that Mr. F. would be awarded a degree at University X, the one with the greater prestige.

PLEASE CHECK THE LOWEST PROBABILITY THAT YOU WOULD CONSIDER ACCEPTABLE TO MAKE IT WORTHWHILE FOR MR. F. TO ENROLL IN UNIVERSITY X RATHER THAN UNIVERSITY Y.

____Place a check here if you think Mr. F. should not enroll in University X, no matter what the probabilities.

____The chances are 9 in 10 that Mr. F. would receive a degree from University X.

____The chances are 8 in 10 that Mr. F. would receive a degree from University X.

____The chances are 7 in 10 that Mr. F. would receive a degree from University X.

____The chances are 6 in 10 that Mr. F. would receive a degree from University X.

____The chances are 5 in 10 that Mr. F. would receive a degree from University X.

____The chances are 4 in 10 that Mr. F. would receive a degree from University X.

____The chances are 3 in 10 that Mr. F. would receive a degree from University X.

____The chances are 2 in 10 that Mr. F. would receive a degree from University X.

____The chances are 1 in 10 that Mr. F. would receive a degree from University X.

7. Mr. G., a competent chess player, is participating in a national chess tournament. In an early match he draws the top-favored player in the tournament as his opponent. Mr. G. has been given a relatively low ranking in view of his performance in previous tournaments. During the course of his play with the top-favored man, Mr. G. notes the possibility of a deceptive though risky maneuver which might bring him a quick victory. At the same time, if the attempted maneuver should fail, Mr. G. would be left in an exposed position and defeat would almost certainly follow.

Imagine that you are advising Mr. G. Listed below are several probabilities or odds that Mr. G.'s deceptive play would succeed. PLEASE CHECK THE LOWEST PROBABILITY THAT YOU WOULD CONSIDER ACCEPTABLE FOR THE RISKY PLAY IN QUESTION TO BE ATTEMPTED.

____The chances are 1 in 10 that the play would succeed.

____The chances are 2 in 10 that the play would succeed.

____The chances are 3 in 10 that the play would succeed.

____The chances are 4 in 10 that the play would succeed.

____The chances are 5 in 10 that the play would succeed.

____The chances are 6 in 10 that the play would succeed.

____The chances are 7 in 10 that the play would succeed.

____The chances are 8 in 10 that the play would succeed.

____The chances are 9 in 10 that the play would succeed.

____Place a check here if you think Mr. G. should not attempt the risky play, no matter what the probabilities.

8. Mr. H., a college senior, has studied the piano since childhood. He has won amateur prizes and given small recitals, suggesting that Mr. H. has considerable musical talent. As graduation approaches, Mr. H. has the choice of going to medical school to become a physician, a profession which would bring certain prestige and financial rewards; or entering a conservatory of music for advanced training with a well-known pianist. Mr. H. realizes that even upon completion of his piano studies, which would take many more years and a lot of money, success as a concert pianist would not be assured.

Imagine that you are advising Mr. H. Listed below are several probabilities or odds that Mr. H. would succeed as a concert pianist. PLEASE CHECK THE LOWEST PROBABILITY THAT YOU WOULD CONSIDER ACCEPTABLE FOR MR. H. TO CONTINUE WITH HIS MUSICAL TRAINING.

____Place a check here if you think Mr. H. should not pursue his musical training, no matter what the probabilities.

____The chances are 9 in 10 that Mr. H. would succeed as a concert pianist.

____The chances are 8 in 10 that Mr. H. would succeed as a concert pianist.

____The chances are 7 in 10 that Mr. H. would succeed as a concert pianist.

____The chances are 6 in 10 that Mr. H. would succeed as a concert pianist.

____The chances are 5 in 10 that Mr. H. would succeed as a concert pianist.

____The chances are 4 in 10 that Mr. H. would succeed as a concert pianist.

____The chances are 3 in 10 that Mr. H. would succeed as a concert pianist.

____The chances are 2 in 10 that Mr. H. would succeed as a concert pianist.

____The chances are 1 in 10 that Mr. H. would succeed as a concert pianist.

9. Mr. J. is an American captured by the enemy in World War II and placed in a prisoner-of-war camp. Conditions in the camp are quite bad, with long hours of hard physical labor and a barely sufficient diet. After spending several months in this camp, Mr. J. notes the possibility of escape by concealing himself in a supply truck that shuttles in and out of the camp. Of course, there is no guarantee that the escape would prove successful. Recapture by the enemy could well mean execution.

Imagine that you are advising Mr. J. Listed below are several probabilities or odds of a successful escape from the prison-of-war camp. PLEASE CHECK THE LOWEST PROBABILITY THAT YOU WOULD CONSIDER ACCEPTABLE FOR AN ESCAPE TO BE ATTEMPTED.

____The chances are 1 in 10 that the escape would succeed.

____The chances are 2 in 10 that the escape would succeed.

____The chances are 3 in 10 that the escape would succeed.

____The chances are 4 in 10 that the escape would succeed.

____The chances are 5 in 10 that the escape would succeed.

____The chances are 6 in 10 that the escape would succeed.

____The chances are 7 in 10 that the escape would succeed.

____The chances are 8 in 10 that the escape would succeed.

____The chances are 9 in 10 that the escape would succeed.

____Place a check here if you think Mr. J. should not try to escape no matter what the probabilities.

10. Mr. K. is a successful businessman who has participated in a number of civic activities of considerable value to the community. Mr. K. has been approached by the leaders of his political party as a possible congressional candidate in the next election. Mr. K.'s party is a minority party in the district, though the party has won occasional elections in the past. Mr. K. would like to hold political office, but to do so would involve a serious financial sacrifice, since the party has insufficient campaign funds. He would also have to endure the attacks of his political opponents in a hot campaign.

Imagine that you are advising Mr. K. Listed below are several probabilities or odds of Mr. K.'s winning the election in his district. PLEASE CHECK THE LOWEST PROBABILITY THAT YOU WOULD CONSIDER ACCEPTABLE TO MAKE IT WORTHWHILE FOR MR. K. TO RUN FOR POLITICAL OFFICE.

_____Place a check here if you think Mr. K. should not run for political office no matter what the probabilities.

_____The chances are 9 in 10 that Mr. K. would win the election.

_____The chances are 8 in 10 that Mr. K. would win the election.

_____The chances are 7 in 10 that Mr. K. would win the election.

_____The chances are 6 in 10 that Mr. K. would win the election.

_____The chances are 5 in 10 that Mr. K. would win the election.

_____The chances are 4 in 10 that Mr. K. would win the election.

_____The chances are 3 in 10 that Mr. K. would win the election.

_____The chances are 2 in 10 that Mr. K. would win the election.

_____The chances are 1 in 10 that Mr. K. would win the election.

11. Mr. L., a married 30-year-old research physicist, has been given a five year appointment by a major university laboratory. As he contemplates the next five years, he realizes that he might work on a difficult long-term problem which, if a solution could be found, would resolve basic scientific issues in the field and bring high scientific honors. If no solution were found, however, Mr. L. would have little to show for his five years in the laboratory, and this would make it hard for him to get a good job afterwards. On the other hand, he could, as most of his professional associates are doing, work on a series of short-term problems where solutions would be easier to find, but where the problems are of lesser scientific importance.

Imagine that you are advising Mr. L. Listed below are several probabilities or odds that a solution would be found to the difficult long-term problem that Mr. L. has in mind.

PLEASE CHECK THE LOWEST PROBABILITY THAT YOU WOULD CONSIDER ACCEPTABLE TO MAKE IT WORTHWHILE FOR MR. L. TO WORK ON THE MORE DIFFICULT LONG-TERM PROBLEM.

_____The chances are 1 in 10 that Mr. L. would solve the long-term problem.

_____The chances are 2 in 10 that Mr. L. would solve the long-term problem.

_____The chances are 3 in 10 that Mr. L. would solve the long-term problem.

_____The chances are 4 in 10 that Mr. L. would solve the long-term problem.

_____The chances are 5 in 10 that Mr. L. would solve the long-term problem.

_____The chances are 6 in 10 that Mr. L. would solve the long-term problem.

_____The chances are 7 in 10 that Mr. L. would solve the long-term problem.

_____The chances are 8 in 10 that Mr. L. would solve the long-term problem.

_____The chances are 9 in 10 that Mr. L. would solve the long-term problem.

_____Place a check here if you think Mr. L. should <u>not</u> choose the long-term, difficult problem, no matter what the probabilities.

12. Mr. M. is contemplating marriage to Miss T., a girl whom he has known for a little more than a year. Recently, however, a number of arguments have occurred between them, suggesting some sharp differences of opinion in the way each views certain matters. Indeed, they decide to seek professional advice from a marriage counselor as to whether it would be wise for them to marry. On the basis of these meetings with a marriage counselor, they realize that a happy marriage, while possible, would not be assured.

Imagine that you are advising Mr. M. and Miss T. Listed below are several probabilities or odds that their marriage would prove to be a happy and successful one.

PLEASE CHECK THE LOWEST PROBABILITY THAT YOU WOULD CONSIDER ACCEPTABLE FOR MR. M. AND MISS T. TO GET MARRIED.

_____Place a check here if you think Mr. M. and Miss T. should not marry, no matter what the probabilities.

_____The chances are 9 in 10 that the marriage would be happy and successful.

_____The chances are 8 in 10 that the marriage would be happy and successful.

_____The chances are 7 in 10 that the marriage would be happy and successful.

_____The chances are 6 in 10 that the marriage would be happy and successful.

_____The chances are 5 in 10 that the marriage would be happy and successful.

_____The chances are 4 in 10 that the marriage would be happy and successful.

_____The chances are 3 in 10 that the marriage would be happy and successful.

_____The chances are 2 in 10 that the marriage would be happy and successful.

_____The chances are 1 in 10 that the marriage would be happy and successful.

A P P E N D I X B

INCREASE IN RISK SCORES FOR ALL ITEMS AND ALL SUBJECTS

Group B_1 - Risky

(Ss positions* - 1, 3, 4, 5)

MALE

Subject Number	Subject's Original Position	Group Number	ITEMS: Increase in Risk Score						Pre-Score	Post-Score	Change Score
			#1	#3	#4	#6	#7	#11			
1	1	1	0	7	0	4	0	-4	17	10	7
2	1	2	2	4	0	0	0	4	20	10	10
3	1	3	0	0	0	0	0	0	6	6	0
4	3	1	2	6	0	2	0	-2	29	21	8
5	3	2	1	-2	0	6	2	1	30	22	8
6	3	3	2	5	2	1	2	0	29	17	12
7	4	1	1	5	2	-1	0	0	27	20	7
8	4	2	0	2	1	0	6	4	34	21	13
9	4	3	0	4	3	1	4	4	34	18	16
10	5	1	2	0	0	2	1	0	29	24	5
11	5	2	-1	-4	4	4	2	1	28	22	6
12	5	3	1	1	4	2	2	0	25	15	10
FEMALE											
13	1	4	0	0	0	0	0	0	6	6	0
14	1	5	0	1	-1	0	4	-1	25	22	3
15	1	6	0	0	0	-1	0	-1	12	14	-2
16	3	4	1	3	1	2	3	-1	29	20	9
17	3	5	2	2	0	1	1	0	26	20	6
18	3	6	-5	-2	1	1	2	2	29	30	-1
19	4	4	3	4	3	2	3	3	34	16	18
20	4	5	-1	1	2	1	4	1	29	21	8
21	4	6	0	0	3	0	3	0	29	23	6
22	5	4	4	2	3	2	4	0	29	14	15
23	5	5	5	1	4	-1	4	-3	25	15	10
24	5	6	3	0	2	0	1	0	26	20	6

*Reported positions are on critical item (#4) only.

Group B_1 - Conservative

(Ss positions - 9, 5, 6, 7)

MALE

Subject Number	Subject's Original Position	Group Number	ITEMS: Increase in Risk Score						Pre-Score	Post Score	Change Score
			#1	#3	#4	#6	#7	#11			
25	9	7	3	1	2	0	7	1	46	32	14
26	9	8	1	2	2	-1	-6	2	43	43	0
27	9	9	0	2	1	-2	1	6	48	40	8
28	5	7	5	1	0	-4	1	-4	28	29	-1
29	5	8	0	-1	0	3	3	1	31	25	6
30	5	9	-5	-3	2	0	-7	0	23	10	13
31	6	7	3	5	0	-2	1	-3	34	30	4
32	6	8	-2	0	1	-1	1	2	31	30	1
33	6	9	-3	1	-2	-1	-4	1	34	42	-8
34	7	7	-1	-1	4	0	-3	1	31	31	0
35	7	8	0	0	2	0	1	2	31	26	5
36	7	9	-5	4	1	1	-7	-3	32	41	-9
FEMALE											
37	9	10	0	-3	6	2	4	-4	41	36	5
38	9	11	2	0	6	2	0	0	30	20	10
39	9	12	6	-5	5	2	4	7	46	27	19
40	5	10	5	-2	3	0	-3	-4	28	27	1
41	5	11	-1	1	1	0	1	-1	32	31	1
42	5	12	2	0	0	1	1	-3	29	28	1
43	6	10	1	3	2	1	0	-1	36	30	6
44	6	11	4	0	2	5	3	1	39	24	15
45	6	12	2	3	-2	-1	4	-3	37	34	3
46	7	10	1	-1	1	-3	3	1	33	31	2
47	7	11	2	-2	6	0	2	1	27	18	9
48	7	12	7	-3	3	-4	-7	-2	27	33	-6

Group B_2 - Risky

(Ss Positions - 1, 4, 4, 4)

MALE

Subject Number	Subject's Original Position	Group Number	ITEMS: Increase in Risk Score						Pre-Score	Post-Score	Change Score
			#1	#3	#4	#6	#7	#11			
49	1	13	2	-2	0	-5	-2	-2	10	19	-9
50	1	14	0	-4	-4	0	-2	0	14	24	-10
51	1	15	0	0	0	0	0	0	7	7	0
52	4	13	1	1	1	0	2	-2	19	22	-3
53	4	14	4	4	1	0	-3	5	36	25	11
54	4	15	4	1	1	2	5	0	33	20	13
55	4	13	4	-3	2	0	0	4	34	27	7
56	4	14	-2	-1	2	-1	0	0	31	29	2
57	4	15	2	0	1	2	1	-3	30	27	3
58	4	13	6	6	2	-4	-1	-2	29	22	7
59	4	14	4	-1	0	0	2	0	28	23	5
60	4	15	3	0	2	4	0	-2	30	23	7
FEMALE											
61	1	16	0	2	-1	2	-2	-2	29	30	-1
62	1	17	4	-9	0	2	0	0	12	15	-3
63	1	18	1	0	-4	2	-2	-2	19	24	-5
64	4	16	6	-3	1	-2	4	3	31	22	9
65	4	17	2	0	0	1	2	-1	33	29	4
66	4	18	0	0	-1	-2	3	1	27	26	1
67	4	16	2	0	0	0	3	0	31	26	5
68	4	17	0	2	3	1	0	1	28	21	7
69	4	18	1	1	1	1	0	-2	29	27	2
70	4	16	3	-2	2	0	0	-1	23	21	2
71	4	17	-3	0	0	0	-1	-1	34	39	-5
72	4	18	1	1	1	0	1	0	28	24	4

Group B_2 - Conservative
(Ss Positions - 9, 6, 6, 6)

MALE

Subject Number	Subject's Original Position	Group Number	ITEMS: Increase in Risk Score						Pre-Score	Post-Score	Change Score
			#1	#3	#4	#6	#7	#11			
73	9	19	-1	5	4	4	7	0	42	23	19
74	9	20	8	0	8	0	1	0	39	22	17
75	9	21	2	4	3	3	1	-1	38	26	12
76	6	19	4	2	2	0	0	2	32	22	10
77	6	20	3	1	3	2	2	2	33	20	13
78	6	21	2	0	1	3	5	-1	36	26	10
79	6	19	3	1	2	1	-5	3	33	28	5
80	6	20	0	1	4	6	1	2	25	11	14
81	6	21	1	-1	1	0	2	0	34	31	3
82	6	19	4	3	2	-4	2	6	34	21	13
83	6	20	-1	1	4	4	1	5	39	24	15
84	6	21	1	2	1	-3	5	1	14	7	7
FEMALE											
85	9	22	6	0	1	4	3	-3	44	33	11
86	9	23	2	1	7	3	5	3	49	28	21
87	9	24	0	1	5	2	2	3	42	29	13
88	6	22	2	1	-2	-5	1	3	31	31	0
89	6	23	-3	0	3	1	0	3	31	27	4
90	6	24	-2	2	-1	0	0	-5	32	38	-6
91	6	22	-1	0	1	0	0	1	37	36	1
92	6	23	0	0	3	1	2	1	33	36	-3
93	6	24	-1	0	3	1	0	-2	30	29	1
94	6	22	-3	-3	3	3	3	0	36	33	3
95	6	23	0	-3	4	-2	-2	6	26	23	3
96	6	24	1	-6	2	2	7	-4	35	33	2

Group B_3 - Risky

(Ss Positions - 1, 3, 3, 6)

MALE

Subject Number	Subject's Original Position	Group Number	ITEMS: Increase in Risk Score						Pre-Score	Post-Score	Change Score
			#1	#3	#4	#6	#7	#11			
97	1	25	-1	-7	0	-1	-1	-2	34	36	-2
98	1	26	-2	0	0	0	0	0	14	12	2
99	1	27	4	4	0	0	8	0	18	2	16
100	3	25	-1	9	-7	0	9	9	36	17	19
101	3	26	2	2	2	0	-2	2	30	24	6
102	3	27	2	0	0	-2	0	0	32	32	0
103	3	25	0	-3	1	0	-2	-3	29	22	7
104	3	26	-2	2	2	0	-6	2	26	28	-2
105	3	27	4	1	1	-5	1	-1	29	28	1
106	6	25	0	-1	5	-2	5	-4	25	22	3
107	6	26	8	-2	5	0	4	5	32	12	20
108	6	27	-5	0	0	0	0	-2	24	31	-7
FEMALE											
109	1	28	4	0	0	0	-1	0	19	16	3
110	1	29	1	0	0	0	2	0	20	17	3
111	1	30	-7	-7	-3	0	0	-4	6	27	-21
112	3	28	5	-3	0	1	0	0	28	25	3
113	3	29	1	0	2	1	-1	1	26	22	4
114	3	30	8	3	-4	-3	-3	-3	27	29	-2
115	3	28	5	0	-2	0	2	0	31	26	5
116	3	29	-3	-1	-1	0	-3	1	29	36	-7
117	3	30	-4	-4	-1	3	8	-1	32	31	1
118	6	28	2	0	1	1	1	2	29	22	7
119	6	29	4	0	4	-3	1	2	31	23	8
120	6	30	-2	1	4	1	0	2	33	27	6

Group B_3 - Conservative
(Ss Positions - 9, 4, 7, 7)

MALE

Subject Number	Subject's Original Position	Group Number	ITEMS: Increase in Risk Score						Pre-Score	Post-Score	Change Score
			#1	#3	#4	#6	#7	#11			
121	9	31	5	3	2	-1	0	-1	43	35	8
122	9	32	1	1	2	0	0	2	37	31	6
123	9	33	0	4	1	2	-1	2	42	34	8
124	4	31	1	0	-2	-2	-1	-2	25	31	-6
125	4	32	2	-2	0	-1	2	-2	27	28	-1
126	4	33	4	1	1	0	5	1	31	19	12
127	7	31	6	3	0	-1	0	-2	30	24	6
128	7	32	1	-1	0	-3	0	1	29	31	-2
129	7	33	1	1	2	-2	3	0	32	27	5
130	7	31	1	6	-2	-5	-4	4	27	27	0
131	7	32	1	-3	0	0	6	0	29	25	4
132	7	33	4	2	2	0	1	0	31	22	9
FEMALE											
133	9	34	3	0	1	-1	0	0	42	39	3
134	9	35	2	1	3	0	4	1	44	33	11
135	9	36	5	-2	4	0	4	0	43	32	11
136	4	34	-2	-1	-3	0	-3	3	34	40	-6
137	4	35	0	7	-1	-2	6	2	37	25	12
138	4	36	3	2	1	4	0	-3	32	25	7
139	7	34	1	5	-1	0	-4	-2	37	38	-1
140	7	35	0	0	2	0	0	2	32	28	4
141	7	36	5	2	4	2	3	-1	40	25	15
142	7	34	-2	3	-1	2	-3	0	38	39	-1
143	7	35	1	2	2	-2	2	0	31	26	5
144	7	36	4	0	3	-1	2	-2	29	23	6

A P P E N D I X C

ANALYSES OF VARIANCE ON CRITICAL ITEM AND OVERALL SCALE

TABLE I

ANALYSIS OF VARIANCE OF CHANGE OF MODERATE SUBJECTS TOWARDS CRITICAL SUBJECTS ON CRITICAL ITEM

Source of Variation	S.S.	d.f.	M.S.	F
A Sex	1.5648	1	1.5648	0.386
B Group Composition	12.7407	2	6.3704	1.572
C Critical Subject	173.787	1	173.787	42.876*
A X B Sex X Group Composition	2.0741	2	1.0370	0.256
A X C Sex X Critical Subject	.0832	1	.0832	0.021
B X C Group Composition X Critical Subject	29.8517	2	14.9259	3.682
A X B X C	5.5556	2	2.7780	0.685
ERROR**	389.111	96	4.0532	
TOTAL	614.769	107		

*Significant at 1% level.

**Error term is a pooled error term of groups within treatments (Mean Square = 4.19; d.f. = 24) and subjects within groups (Mean Square = 4.01; d.f. = 72).

TABLE II

ANALYSIS OF VARIANCE OF CHANGE OF MODERATE SUBJECTS TOWARD CRITICAL SUBJECTS ON OVERALL SCALE

Source of Variation	S.S.	d.f.	M.S.	F
A Sex	1.12	1	1.12	--
B Critical Subject	2591.12	1	2591.12	43.06*
A X B	83.56	1	83.56	1.39
Groups within Treatments (Error A)**	1925.64	32	60.18	2.39*
Subjects within Groups (Error B)	1811.11	74	25.15	
TOTAL	6412.55	107		

*Significant at 1% level.

**Since groups within treatments were significant when subjects within groups were used as error term, the error terms could not be pooled and groups within treatments were used as the error term to evaluate the treatment effects.

TABLE III

ANALYSIS OF VARIANCE OF INCREASE
IN RISK TAKING FOR MODERATE SUBJECTS ON CRITICAL ITEM

Source of Variation	S.S.	d.f.	M.S.	F
A Sex	.0093	1	.0093	0.002
B Group Composition	26.9630	2	13.4815	3.456
C Critical Subject	.0093	1	.0093	0.002
A X B Sex X Group Composition	5.6296	2	2.8148	0.722
A X C Sex X Critical Subject	2.6758	1	2.6758	0.686
B X C Group Composition X Critical Subject	12.0740	2	6.0370	1.548
A X B X C	1.4073	2	0.7037	0.180
ERROR*	374.445	96	3.9005	
TOTAL	423.213	107		

*Error term is a pooled error term of groups within treatments (Mean Square = 4.74; d.f. = 24) and subjects within groups (Mean Square = 3.62; d.f. = 72).

TABLE IV

ANALYSIS OF VARIANCE OF INCREASE IN RISK
TAKING FOR MODERATE SUBJECTS ON CRITICAL ITEM

Source of Variation	S.S.	d.f.	M.S.	F
A Sex	87.12	1	87.12	1.47
B Critical Subject	98.23	1	98.23	1.65
A X B Sex X Critical Subject	1.57	1	1.57	--
Groups within Treatments (Error A)**	1902.00	32	59.44	2.37*
Subjects within (Error B)	1807.33	72	25.10	
TOTAL	3896.25	107		

*Significant at 1% level.

**Since groups within treatments were significant when subjects within groups were used as error term, the error terms could not be pooled and groups within treatments were used as the error term to evaluate the treatment effects.

TABLE V

ANALYSIS OF VARIANCE OF INCREASE IN RISK
TAKING OF CRITICAL SUBJECTS ON THE CRITICAL ITEM

Sources of Variation	S.S.	d.f.	M.S.	F
A Sex	1.79	1	1.79	--
B Group Composition	5.73	2	2.86	1.05
C Critical Subject	160.45	1	160.45	58.99**
A X B Sex X Group Composition	9.04	2	4.52	1.66
A X C Sex X Critical Subject	8.98	1	8.98	3.30
B X C Group Composition X Critical Subject	19.05	2	9.52	3.50*
A X B X C	8.19	2	4.09	1.50
ERROR	65.33	24	2.72	
TOTAL	278.56	35		

* Significant at 5% level

** Significant at 1% level

TABLE VI

ANALYSIS OF VARIANCE OF INCREASE IN RISK TAKING
OF CRITICAL SUBJECTS ON THE OVERALL SCALE

Source of Variation	S.S.	d.f.	M.S.	F
A Sex	3.49	1	3.49	
B Critical Subject	1332.38	1	1332.38	24.90*
A X B Sex X Critical Subject	33.90	1	33.90	
ERROR	1725.87	32	53.90	
TOTAL	3095.64	35		

* Significant at 1% level

TABLE VII

ANALYSIS OF VARIANCE OF CHANGE OF CRITICAL
SUBJECTS AWAY FROM THEIR FORMER POSITIONS ON CRITICAL ITEM

Source of Variation	S.S.	d.f.	M.S.	F
A Sex	9.00	1	9.00	3.306
B Group Composition	19.0556	2	9.5278	3.500
C Critical Subject	69.4444	1	69.4444	25.510**
A X B Sex X Group Composition	8.1667	2	4.0333	1.500
A X C Sex X Critical Subject	1.7778	1	1.7778	0.650
B X C Group Composition X Critical Subject	5.7222	2	2.8611	1.051
A X B X C	9.0555	2	4.5278	1.663
ERROR	65.3333	24	2.7222	
TOTAL	187.556	35		

* Significant at 5% level

** Significant at 1% level

TABLE VIII

ANALYSIS OF VARIANCE OF CHANGE OF CRITICAL SUBJECTS AWAY FROM THEIR FORMER POSITIONS ON OVERALL SCALE*

Source of Variation	S.S.	d.f.	M.S.	F
A Sex	56.2500	1	56.2500	0.921
B Critical Subject	930.250	1	930.250	15.227**
A X B Sex X Critical Subject	12.2500	1	12.2500	0.201
ERROR	1954.89	32	61.0903	
TOTAL	2953.64	35		

*Because group composition was controlled on only the critical item this analysis over items did not contain the group composition breakdown variable.

** Significant at 1% level

A P P E N D I X D

CORRELATIONAL MATRICES BETWEEN TALKING SCORES AND GROUP AND INDIVIDUAL CHANGE

TABLE I

CORRELATIONAL MATRIX FOR ALL SUBJECTS
ON OVERALL SCALE

	1	2	3	4	5
1. Individual Change	1.000	0.530**	0.092	0.170	0.172
2. Group Change		1.000	0.174	0.242**	0.225**
3. Individual Talking			1.000	0.718**	0.466**
4. Group Talking				1.000	0.948**
5. Group Talking Minus Individual Talking					1.000

** Significant at 1% level (2-tailed)

TABLE II

CORRELATION FOR ALL SUBJECTS ON CRITICAL ITEM

	1	2	3	4	5
1. Individual Change	1.000	0.673**	0.071	0.145	0.155
2. Group Change		1.000	0.167	0.216**	0.207*
3. Individual Talking			1.000	0.777**	0.584**
4. Group Talking				1.000	0.963**
5. Group Talking Minus Individual Talking					1.000

* Significant at 5% level (2-tailed)

** Significant at 1% level (2-tailed)

TABLE III

CORRELATIONAL MATRIX FOR CONSERVATIVE SUBJECTS
ON THE OVERALL SCALE

	1	2	3	4	5
1. Individual Change	1.000	0.637**	0.146	0.148	0.131
2. Group Change		1.000	0.326	0.146	0.059
3. Individual Talking			1.000	0.777**	0.598**
4. Group Talking				1.000	0.369**
5. Group Talking Minus Individual Talking					1.000

** Significant at 1% (2-tailed)

TABLE IV

CORRELATIONAL MATRIX FOR RISKY SUBJECTS
ON THE OVERALL SCALE

	1	2	3	4	5
1. Individual Change	1.000	0.313	0.277	0.332	0.310
2. Group Change		1.000	0.437*	0.406*	0.327
3. Individual Talking			1.000	0.811**	0.585**
4. Group Talking				1.000	0.949**
5. Group Talking Minus Individual Talking					1.000

* Significant at 5% level (2-tailed)

** Significant at 1% level (2-tailed)

TABLE V

CORRELATIONAL MATRIX FOR MODERATE SUBJECTS
ON THE OVERALL SCALE

	1	2	3	4	5
1. Individual Change	1.000	0.601**	0.133	0.201	0.197
2. Group Change		1.000	0.141	0.255*	0.261*
3. Individual Talking			1.000	0.695**	0.441**
4. Group Talking				1.000	0.951**
5. Group Talking Minus Individual Talking					1.000

* Significant at 5% level (2-tailed)

** Significant at 1% level (2-tailed)

TABLE VI

CORRELATIONAL MATRIX FOR CONSERVATIVE SUBJECTS
ON THE CRITICAL ITEM

	1	2	3	4	5
1. Individual Change	1.000	0.881*	0.256	0.031	-0.136
2. Group Change		1.000	0.369	0.169	0.052
3. Individual Talking			1.000	0.727*	0.518*
4. Group Talking				1.000	0.935*
5. Group Talking Minus Individual Talking					1.000

* Significant at 1% level (2-tailed)

TABLE VII

CORRELATIONAL MATRIX FOR RISKY SUBJECTS
ON THE CRITICAL ITEM

	1	2	3	4	5
1. Individual Change	1.000	0.916**	0.048	0.313	0.404*
2. Group Change		1.000	0.042	0.279	0.360
3. Individual Talking			1.000	0.858**	0.716**
4. Group Talking				1.000	0.973**
5. Group Talking Minus Individual Talking					1.000

* Significant at 5% level (2-tailed)

** Significant at 1% level (2-tailed)

TABLE VIII

CORRELATIONAL MATRIX FOR MODERATE SUBJECTS
ON THE CRITICAL ITEM

	1	2	3	4	5
1. Individual Change	1.000	0.632**	0.108	0.139	0.134
2. Group Change		1.000	0.174	0.216*	0.205*
3. Individual Talking			1.000	0.763**	0.567**
4. Group Talking				1.000	0.965**
5. Group Talking Minus Individual Talking					1.000

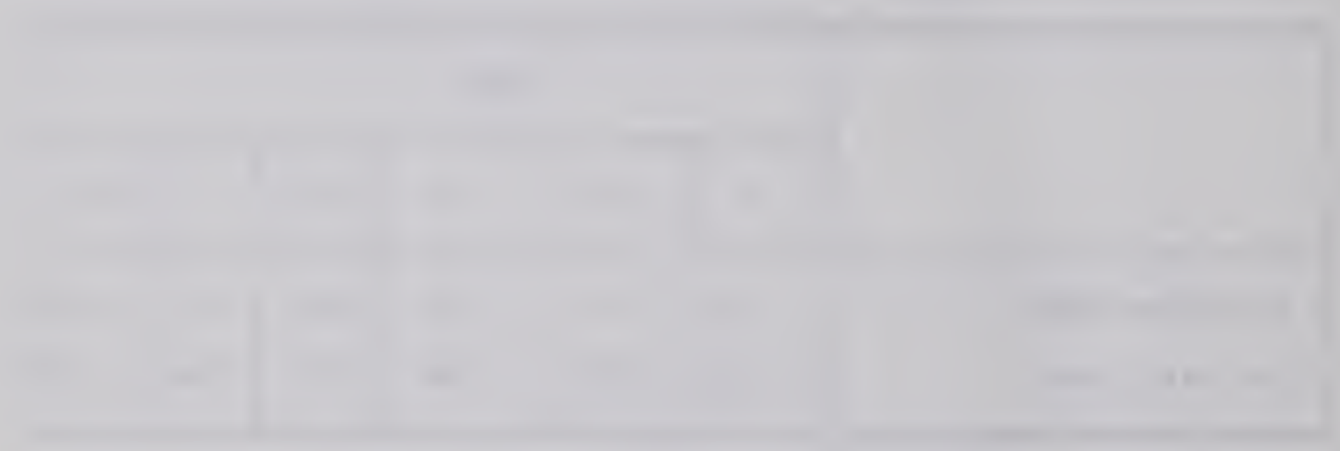
* Significant at 5% level (2-tailed)

** Significant at 1% level (2-tailed)

TABLE IX

CORRELATIONS BETWEEN CRITICAL SUBJECTS TALKING
AND INCREASE IN RISK TAKING OF MODERATE SUBJECTS

	ITEMS					
	#1	#3	#4	#6	#7	#11
High Risk Taker	-.115	.167	-.131	.333	.040	.295
Low Risk Taker	-.083	-.031	.394	.242	.098	-.149



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